CLEARING MODES OF OPERATION OF MEDICAL ENGINEERING DEVICES

FIELD OF THE INVENTION

The present invention pertains to a process for clearing modes of operation of a medical engineering device. The modes of operation are functions which are already implemented in the software of a medical engineering device, especially a respirator, or can be implemented with software or otherwise. In the case of a respirator, a mode of operation corresponds, e.g., to a certain mode of operation such as IMV (Intermittent Mandatory Ventilation), CPAP (Continuous Positive Airway Pressure) or HFV (High-Frequency Ventilation).

BACKGROUND OF THE INVENTION

A device and a process for controlling a respirator are described in US 5,931,160. The different modes of operation are performed or modified on the device according to rules set on the device before according to the user's specification.

The fact that the user must determine in advance what modes of operation shall be available to him at the time of the purchase is a drawback of the prior-art device. If the profile of requirements imposed on the device changes, i.e., additional modes of respiration are desired, and some modes of respiration are no longer necessary, the corresponding software modification with respect to the new profile of requirements must be performed on the device itself. This service can only be performed on site and is therefore associated with additional efforts and costs.

SUMMARY AND OBJECTS OF THE INVENTION

The object of the present invention is to provide a process with which the modes of operation available on a medical engineering device can be changed without a great technical effort.

According to the invention, a process for clearing modes of operation on a medical engineering device is provided with the following steps:

a) data that specify a number of different available modes of operation on the medical engineering device are read into an external electronic, optical or magnetic storage medium,

b) the data are read by a writing and reading unit associated with the medical

engineering device,

c) the data read by the writing and reading unit determine the clearing of the available modes of operation on the medical engineering device.

The clearing of the modes of operation is performed such that data that specify a certain selection of different available modes of operation on the medical engineering device are read into an external electronic, optical or magnetic storage medium, e.g., a chip card. The chip card can then be introduced, e.g., into a writing and reading unit, which is associated with the medical engineering device and reads the data being stored on the chip card or generally on the storage medium. These data subsequently determine the clearing of exactly the modes of operation that shall be available on the medical engineering device. The medical engineering device may be a respirator and the modes of operation may be modes of respiration.

In a preferred embodiment of the process, the data are coded in the storage medium with a device-specific code, which may additionally be copy-protected. The writing and reading unit of the medical engineering device comprises means for decoding this code in order to subsequently read the data.

A time period for which a mode of operation shall be available may be specified for the individual available modes of operation. This may be performed, e.g., in the form of a time log which is kept for each mode of operation and by which time units during which the clearing of the mode of operation in question is performed can be debited. These time logs, which are kept in the storage medium, especially the chip card, can be filled up by an external writing unit, e.g., by the distributor of the chip cards or via the Internet.

The external storage medium is not bound to a special medical engineering device but can be used for a previously selected class of medical engineering devices of the same model, which are provided with a corresponding writing and reading unit.

In another embodiment, the data being stored in the storage medium can be transferred by the writing and reading unit which determines the clearing of the modes of operation that shall be available on the medical engineering device into a memory of the medical engineering device, or conversely, these data being stored in the memory of the medical engineering device can be transferred from the storage and reading unit into the storage medium.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Figure 1A is a schematic view showing a medical engineering device, particularly a respirator and a chip card located outside the respirator;

Figure 1B is a schematic view showing a medical engineering device, particularly the respirator of Figure 1A with the chip card introduced;

Figure 2 is the respirator and with the chip card provided with a code; and

Figure 3 is the respirator and the chip card provided with a time log.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular, Figure 1A shows a respirator 1 and a chip card 2 located outside the respirator 1. Data that specify HFV (High-Frequency Ventilation) as an available mode of respiration on the respirator 1 are present on the chip card 2. In Figure 1A the writing and reading unit 3, which is associated with the respirator 1, has not yet read the data present on the chip card 2. HFV (High-Frequency Ventilation) is therefore displayed as unavailable on the display screen 5 of the modes of respiration, symbolized by "HFV" being crossed out. An arrow extends from the chip card 2 in the direction of a card slot 6, which is located on the respirator 1. The same arrangement as shown as in Figure 1A is shown in Figure 1B with the difference that the chip card 2 has been introduced into the card slot 6. In this position, the chip card 2 can be read by the writing and reading unit 3. The data present on the chip card 2 specify HFV (High-Frequency Ventilation) as an available mode of respiration. The data present on the chip card 2 determines the clearing of the mode of operation HFV (High-Frequency Ventilation). The mode of respiration HFV (High-Frequency Ventilation) is correspondingly no longer displayed as a crossed-out word on the display screen 5 of the modes of respiration. As long as the chip card 2 is in the card slot 6, the mode of respiration HFV (High-Frequency ventilation) is cleared. If the mode of respiration is needed on another device of the same model as the respirator 1, the chip card 2 is removed from the card slot 6 and is introduced into a comparable slot of the other device. Such another device with slot is not

shown in Figure 1.

Figure 2 shows a respirator 1 with an identification number 8 as well as a chip card 2 with a code 7. The code 7 is copy-protected. If the chip card 2 is read by the writing and reading unit 3, the writing and reading unit 3 first downloads the code 7 from the chip card. The writing and reading unit 3 decodes the code 7 and also reads the other data present on the chip card 2. The downloading procedure is represented by an arrow that points from the code 7 present on the chip card 2 to the code 7a that is already present in the writing and reading unit 3 and is indicated by dotted lines. Conversely, the writing and reading unit 3 wires an identification number 8 of the respirator 1 on the chip card 2 after this has been read. The identification number 8 is stored on the chip card 2. The storage procedure is indicated by an arrow that points from the identification number 8 present on the respirator 1 to the identification number 8a that is already present on the chip card 2 and is indicated by broken lines.

The chip card 2 can thus be removed from the respirator 1 at any time, but no modes of respiration can be cleared by inserting the chip card 2 into another device because the code 7, which would first have to be decoded for this purpose, is no longer on the chip card 2 but in the respirator 1. The identification number 8a being stored on the chip card 2 is recognized by the writing and reading unit 3 and the code 7a is automatically reloaded from the writing and reading unit 3 onto the chip card 2 only when the chip card 2 is again introduced into the respirator 1. The code 7a is now again on the chip card 2, so that modes of respiration can also be cleared on other devices of the same model as the respirator 1 by inserting the chip card 2.

Figure 3 shows a respirator 1 and a chip card 2 provided with a time log 9 for the mode of respiration HFV (High-Frequency Ventilation). The chip card 2 is outside the respirator 1. However, it can be introduced into the respirator 1 and can also be removed from same. These two possibilities are indicated by two arrows, which extend from the chip card 2 to the writing and reading unit 3 and from the writing and reading unit 3 to the chip card 2. The time log 9 of the chip card comprises a total of 18 operating hours ("1 hr."), of which three operating hours ("1 hr.") have already been debited, characterized by three crossed-over fields of a total of 18 fields, all of which are provided with the label "1 hr."

If the chip card 2 is introduced into the respirator 1 to clear the mode of respiration HFV (High-Frequency Ventilation), 3 operating hours are debited from the time log 9 by the writing and reading unit 3 corresponding to the operating time of the respirator 1 in the mode of respiration HFV (High-Frequency Ventilation).

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.